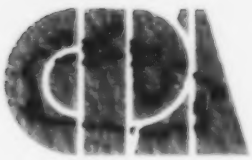

CANADIAN PETROLEUM ASSOCIATION
PIPELINE DIVISION

OIL PIPELINE PERFORMANCE REVIEW

1988

CANADIAN PETROLEUM ASSOCIATION

PIPELINE DIVISION

OIL PIPELINE PERFORMANCE REVIEW

1988

- TECHNICAL COMMITTEE -

OIL PIPELINE PERFORMANCE REVIEW SUBCOMMITTEE

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CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW

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1988 OIL PIPELINE PERFORMANCE REVIEW

EXECUTIVE SUMMARY

A. GENERAL OVERVIEW

- The number of failures was down, both in total and on a per kilometre basis compared to 1987.
- No injuries or deaths were associated with the 1988 failures, as compared to a total of 19 injuries and 3 deaths which occurred over the previous ten years.
- Although the number of equipment failures and operational errors have remained constant, these items now reflect a larger percentage of a decreased number of failures.
- Five of the 34 reported failures were detected by some form of mechanical or electronic detection system.
- Repair, damage, and clean-up costs were up 76% compared to 1987 and 33% greater than the previous 10 year average.

B. 1988 HIGHLIGHTS

i) Performance

- In-service length of reporting systems increased from 33, 621 km in 1987 to 33,856 km in 1988.
- Deliveries increased approximately 5.5% to 243 X 10^6 m^3 in 1988 compared to 1987.
- Traffic volume increased approximately 14% to 160 X 10^9 m^3 km compared to 1987.

ii) Failures

- Thirty-four failures were reported in 1988.
- The average spill size was 36 m^3 compared to 97 m^3 in 1987 and 140 m^3 over the previous 10 years.
- Total volume released was down by 69% compared to 1987.
- Failures involving HVP product were limited to two minor failures within pump stations, with a total release of 0.5 m^3.
- 1988 failures resulted in no deaths, injuries nor explosions but one fire at a pump station.

EXHIBIT 1

1988 OIL PIPELINE PERFORMANCE REVIEW
SUMMARY OF FAILURES

CANADIAN PETROLEUM ASSOCIATION

1988 OIL PIPELINE PERFORMANCE REVIEW

SUMMARY OF FAILURES

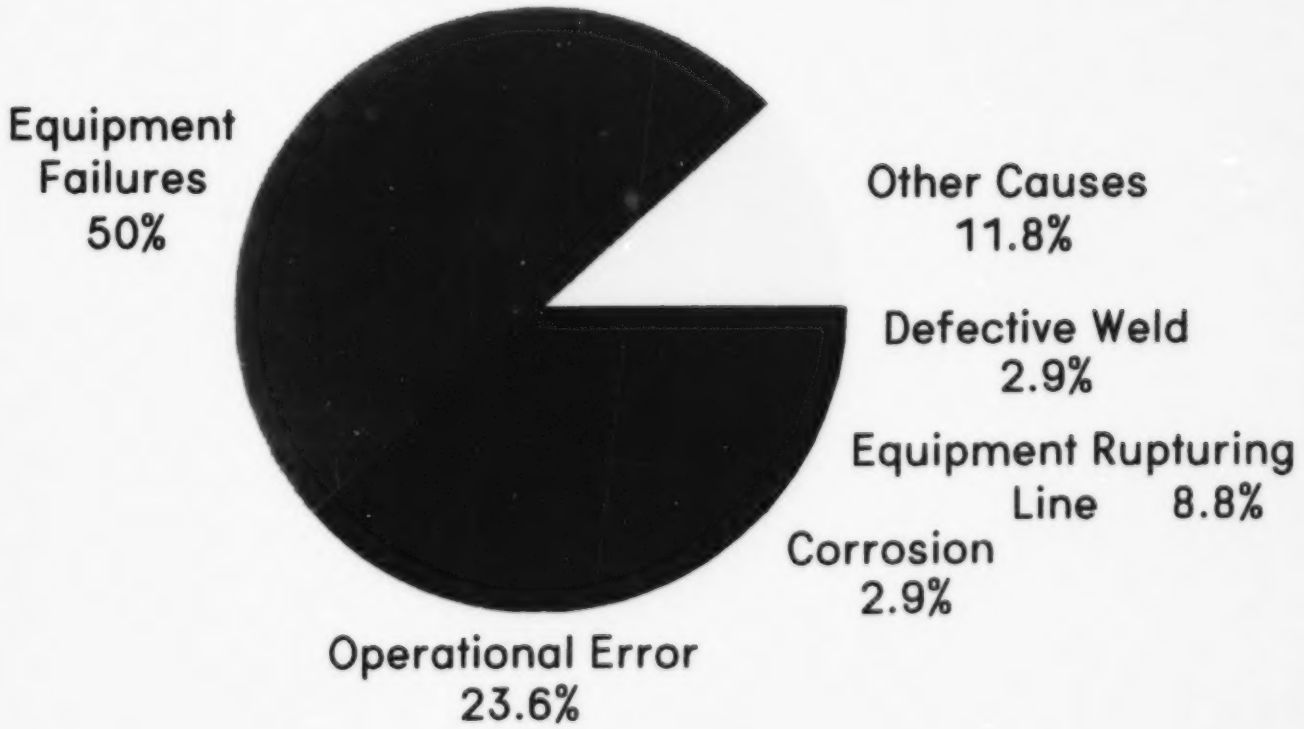


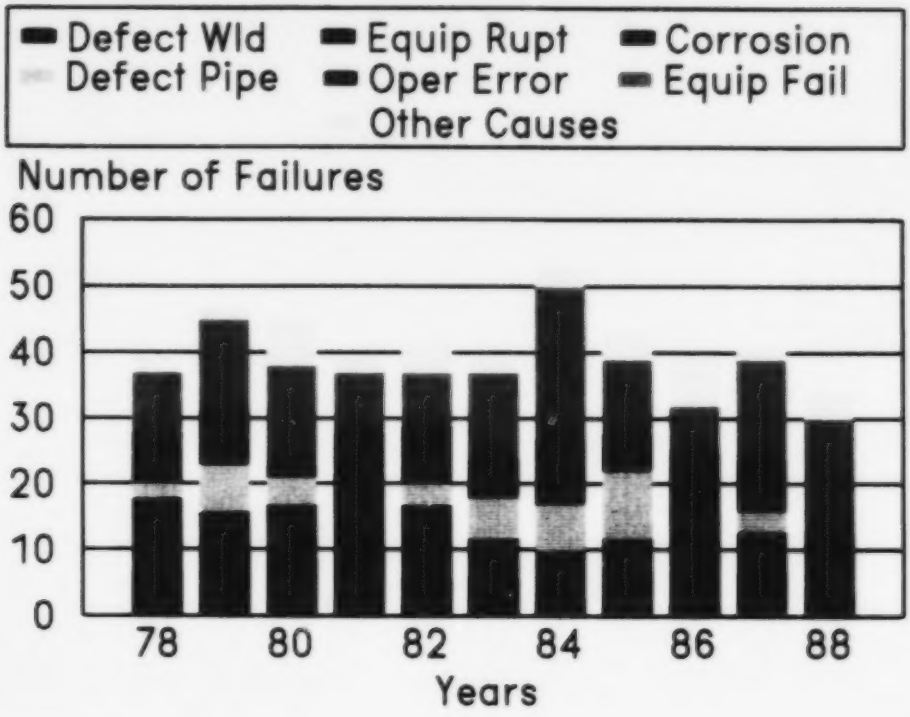
EXHIBIT 2

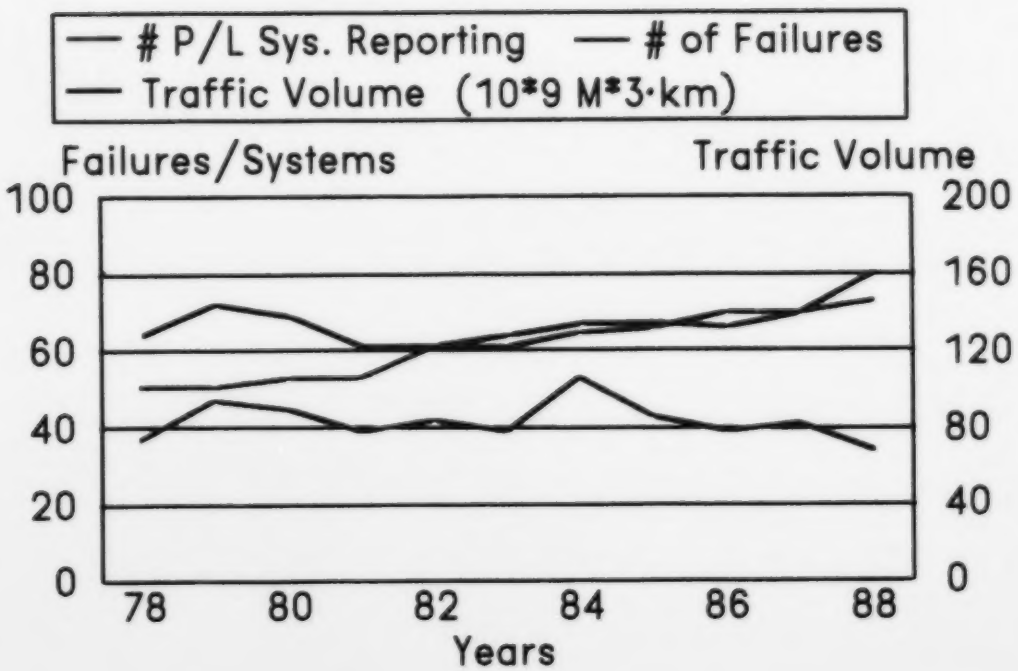
1988 OIL PIPELINE PERFORMANCE REVIEW
HISTORICAL SUMMARY OF FAILURES

CANADIAN PETROLEUM ASSOCIATION

1988 OIL PIPELINE PERFORMANCE REVIEW

HISTORICAL SUMMARY OF FAILURES





CANADIAN PETROLEUM ASSOCIATION

1988 OIL PIPELINE PERFORMANCE REVIEW

1.0 INTRODUCTION

All liquid hydrocarbon pipelines in Canada, including crude oil, refined products and High Vapour Pressure (HVP) lines are requested to participate in this industry analysis by submitting voluntary, confidential performance and failure reports. The majority of these pipeline systems are represented by the Canadian Petroleum Association (CPA).

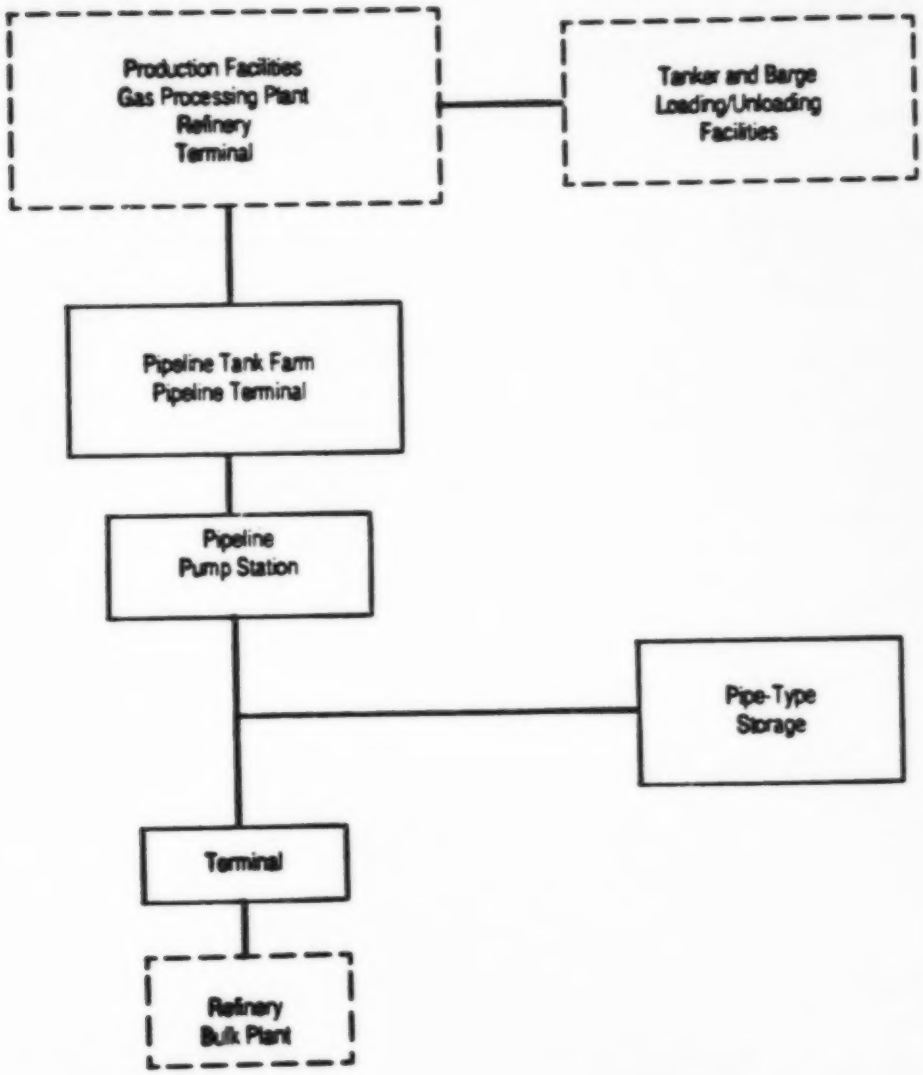
Pipelines included in this review fall within the scope of CAN3-Z183-M86, Oil Pipeline Transportation Systems. However, only oil lines and high vapour pressure pipelines downstream of production facilities and refined petroleum product lines are covered. Multi phase lines, producer operated pipelines and flow lines now included in CAN3-Z183-M86 are not covered. This scope is shown diagrammatically in Exhibit 3.

All data for the review was collected by CPA on two standard forms. Samples of the Oil Pipeline General Data Report and the Oil Pipeline Failure Report are included in Appendix B. Incidents resulting in a spill of 1.5 m^3 or more of oil, or any amount of HVP material, and any incident involving an injury, a death, a fire, or an explosion are classified as reportable.

Care must be exercised in any attempt to apply or compare statistics included in this review to any particular pipeline system or regulatory jurisdiction. They have been generated on the basis of submissions from a wide variety of pipelines, including gathering systems.

EXHIBIT 3

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW SCOPE



Note: Only facilities and pipelines indicated by solid lines are within scope of CPA - Oil Pipeline Performance Review.

2.0 PERFORMANCE REVIEW

Seventy-three participating Canadian oil pipeline systems submitted reports. This represents in excess of 90% of the industry and includes all major oil pipeline systems. The statistics in this review are, therefore, considered representative of the industry.

2.1 1988 SUMMARY

One fire was reported but there were no injuries or explosions.

The average spill was 36 m^3 in 1988 - 63% smaller than the 1987 average.

Repair damage and clean-up costs were higher in 1988 due to one incident contributing 43% of the cost.

Five leaks were detected by leak detection systems.

Deliveries increased 5.5%.

HVP loss accounted for 0.5 m^3 of the total 1224 m^3 spilled.

2.2 1988 VS 1987 HIGHLIGHTS

A comparison of key results is provided in the table below:

	1988	1987	% Change
Pipelines Systems Reporting	73	70	+4.3
Length of Line In-Service - km	33856	33621	+0.7
Delivery Volume X 10^6 m^3	243	230	+5.5
Traffic Volume X 10^9 m^3/km	160	140	+14.4
No. of Failures	34	41	-17.1
Volume spilled - m^3	1224	3977	-69.2
Repair, Damage & Clean-up Costs - k$	1768	1005	+75.8
Injuries	0	1	-
Deaths	0	0	-

2.3 HISTORICAL REVIEW

A 10 year statistical summary of oil pipeline performance data is presented in Exhibit 4.

Key observations and highlights compared with the previous 10 year average are:

- Length of line in service, total delivery volume and total traffic volume were all up.
- The number of failures reported was down.
- Repair, damage and clean-up costs were up.
- No injuries were reported.
- A comparison of key results is provided in the table below.

	1988	Previous Ten Year Average	% Change
Pipelines Systems Reporting	73	60	+21.7
Length of Line In-Service - km	33856	30819	+9.9
Delivery Volume X 10^6 m^3	243	220	+10.5
Traffic Volume X 10^9 m^3/km	160	133	+20.5
No. of Failures	34	42	-20.0
Volume spilled - m^3	1224	5971	-79.5
Repair/Clean-up Costs - k$	1768	1327	+33.3
Injuries	0	1.9	-
Deaths	0	0.3	-

EXHIBIT 4

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW STATISTICAL SUMMARY

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Number of Pipeline Systems Reporting	51	51	53	53	61	61	65	66	70	70	73
Length of Line in Service - km	30569	29678	29785	29650	30308	30439	30615	30905	32617	33621	33856
Delivery Volume X 10^6 m^3	212.3	245.4	235.7	214.9	211.6	204.4	215.3	211.6	219.0	230.5	243.2
Traffic Volume, X 10^9 m^3/km	129.2	144.8	138.5	122.6	123.1	128.7	134.1	135.0	132.6	140.0	160.1
Number of Failures	37	47	45	39	42	39	53	43	39	41	34
Failures/10^3 km	1.2	1.6	1.5	1.3	1.4	1.3	1.7	1.4	1.2	1.2	1.0
Failures/10^9 m^3 km	0.29	0.32	0.33	0.33	0.34	0.30	0.39	0.32	0.29	0.29	0.21
Volume Spilled - m^3	4881	7014	8511	2377	6537	7450	6171	10738	2055	3977	1224
Volume Loss - m^3	742	2614	5931	1427	3531	6038	2982	7830	654	3154	496
Average Spill Size - m^3	132	149	189	61	156	196	116	250	53	97	36
Largest spill Size - m^3	2970	1987	6061	516	1365	1589	1994	3800	320	2800	284
Injuries Resulting from Failures	0	1	0	0	2	4	2	5	4	1	0
Deaths Resulting from Failures	0	0	0	0	0	1	0	2	0	0	0
Repair, Damage and Spill Clean-up Costs k$ **	431	1611	1254	634	1320	2721	953	2533	794	1005	1768

* Not all volumes move total system length.
** Does not include cost of product lost due to failure.

3.0 FAILURE SUMMARY

3.1 HIGHLIGHTS

Sixteen of the 73 participating pipeline systems reported a total of 34 failures in 1988. The number of failures reported for 1988 are down from the 41 failures reported in 1987 and less than the 10 year average of 42. Failures were distributed as follows:

Nine Systems - 1 Failure
One System - 2 Failures
Five Systems - 3 Failures
One System - 8 Failures

Exhibit 5 provides a summary of 1988 failure categories.

Exhibit 6 provides additional details for each failure category. There was one fire associated with a pump failure in 1988. There were no explosions and no injuries associated with the failures reported in 1988.

Fifty-three percent of the failures were detected by pipeline employees, 32% by outside parties and 15% by surveillance and leak detection systems*.

* For the purpose of this report the definition of surveillance and leak detection systems includes material balance systems, and/or any other mechanical or electronic means which would detect the possibility of a leak and initiate a response.

3.2 1988 VS PREVIOUS TEN YEAR AVERAGE

SUMMARY OF FAILURES

	1988	Previous 10 Year Average
Equipment Failures	17	12
Equipment Rupturing Line	3	7
Corrosion	1	8
Operational Error	8	8
Defective Pipe	0	4
Defective Weld	1	<1
Other	4	3
TOTAL	34	42

EXHIBIT 5

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW
LIST OF FAILURES BY CATEGORY

	LVP	HVP	TOTAL
EQUIPMENT FAILURES			
Gasket	1	1	2
Fittings	3	1	4
Packing	1	-	1
Bushing	1	-	1
Pump Seals	1	-	1
Alarm	1	-	1
Expansion Joint	1	-	1
Control Valve	1	-	1
Valves	4	-	4
Strainer	1	-	1
	15	2	17
EQUIPMENT RUPTURING LINE			
Contract Equipment	3	-	3
	3	0	3
CORROSION			
External	0	-	0
Internal	1	-	1
	1	0	1
OPERATIONAL ERROR			
Valve not Closed	3	-	3
Overfilling	2	-	2
Miscellaneous	1	-	1
Overpresure Piping	2	-	2
	8	0	8
DEFECTIVE PIPE	0	0	0
DEFECTIVE WELD			
Fillet Weld	1	-	1
	1	0	1
OTHER			
Pipe Previously Damaged	4	-	4
	4	0	4
TOTAL	32	2	34

EXHIBIT 6

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW STATISTICAL SUMMARY

	EQUIPMENT FAILURE	EQUIPMENT RUPTURING LINE	CORROSION EXTERNAL	CORROSION INTERNAL	OPERATIONAL ERROR	DEFECTIVE PIPE	DEFECTIVE WELDS	OTHER	TOTAL
NUMBER OF FAILURES	17	3	0	1	8	0	1	4	34
Failure Location									
- Line Pipe	1	2	0	0	0	-	0	4	7
- Pump Station	9	-	-	-	3	-	1	-	13
- Tank Farm	5	1	-	-	3	-	-	-	9
- Delivery Point	2	-	-	1	2	-	-	-	5
Detection Method									
- Outside Party	6	1	-	1	1	-	-	2	11
- Pipeline Employee	8	1	-	-	6	-	1	2	18
- R.O.W. Surveillance	-	-	-	-	-	-	-	-	0
- Leak Detection	3	1	-	-	1	-	-	-	5
Failure Impact									
- Injuries	-	-	-	-	-	-	-	-	0
- Fires	1	-	-	-	-	-	-	-	1
- Explosions	-	-	-	-	-	-	-	-	0
- Area Damaged (Hectares)	25.7	1.5	-	-	1.2	-	-	3.8	32.2
- Costs (K$) *	863	60	-	10	194	-	99	542	1768
- Clean-Up Time (Days)	39	3	-	1	60	-	1	56	160
- Shutdown Time (Days)	2.8	3.6	-	0.2	0.3	-	0.5	11.8	19.2
Spill Volume (m^3)									
- Released	388	343	-	3	355	-	2	133	1224
- Lost	272	159	-	-	20	-	1	32	484
- Reclaimed	78	173	-	3	298	-	1	98	651
- Disposed	38	11	-	-	37	-	-	3	89
Commodity Released									
- Crude Oil	15	2	-	1	5	-	1	4	28
- Condensate	-	-	-	-	1	-	-	-	1
- Refined Products	-	1	-	-	2	-	-	-	3
- HVP	2	-	-	-	-	-	-	-	2

* Repair, Damage, and Clean-Up Costs only

APPENDIX A

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW
FAILURE DETAILS

Failures have been arranged into seven categories as indicated in Exhibits 5 and 6. Details of each failure category are as follows:

1. EQUIPMENT FAILURE

This category accounted for 17 (50%) of the failures in 1988, an increase of five when compared to the 10 year average. There was one fire associated with these failures. A total of 388 m^3 was released with about 273 m^3 lost.

Threaded nipples accounted for four failures, while leaking valves caused four others.

The three most significant failures are highlighted as follows:

i) A pump seal failed releasing 1.5 m^3 of crude. A fire resulted from this failure which destroyed the pump unit. After the fire was extinguished it was observed that a gas line to a line heater was also ruptured.

ii) A gasket on a pig trap failed and caused 250 m^3 of crude to spill. None of this product was recovered.

iii) A screwed nipple failed, and 40 m^3 of crude oil was released of which 15 m^3 was lost.

2. EQUIPMENT RUPTURING LINE

In 1988 there were three failures in this category, three less than 1987 and four less than the previous 10 year average.

One failure occurred as a result of an excavation by a landowner without advising the pipeline operator. This failure resulted in the release of 284 m^3 of gasoline, which represented 72% of the volume released in this category.

One failure was a result of construction activities within the limits of a tank farm. A small amount of crude oil was released and recovered.

Another failure occurred when a contractor's dozer struck an above ground block valve. This resulted in a release of 58 m^3 of crude oil of which 46 m^3 was recovered.

3. CORROSION

The one corrosion failure for 1988 compares with the previous 10 year average of eight corrosion failures.

External

There were no leaks due to external corrosion during 1988.

Internal

Internal corrosion accounted for one failure compared to two in the previous year. A total of 3 m^3 of crude oil was released which is significantly less than in 1987.

The leak occurred as a result of internal corrosion on a pump suction line.

4. OPERATIONAL ERROR

There were eight incidents attributed to operational error that resulted in the release of 355 m^3 (20 m^3 lost). This frequency of operational error matches both the previous year's incidents and the previous 10 year average.

i) Three incidents of valves not being closed resulted in the release of 47 m^3 (12.5 m^3 lost).

ii) There were two incidents of tanks being over-filled. A total of 95 m^3 was released (5 m^3 lost).

iii) One incident involved the off loading of trucked volumes of crude into an open ended section of line that had been left uncapped while it was out of service. A total of 135 m^3 of crude was spilled and all but 0.5 m^3 was recovered.

iv) 45 m^3 of crude was released as a result of piping being over pressured which set off a relief valve and caused a sump tank to overflow. The entire 45 m^3 was recovered.

5. DEFECTIVE PIPE

There were no failures in 1988 due to defective pipe.

6. DEFECTIVE WELDS

There was one defective weld that resulted in 1.5 m^3 of crude being released. The source of the leak was found to be two pin holes that had developed at a cracked weld of a weld-on fitting.

7. OTHER

There were four failures attributed to other causes which accounted for 11% of the total volume spilled.

All four failures occurred due to pipe being previously damaged, resulting in a release of 133 m^3 of crude oil (32 m lost).

Two of these incidents were a result of pipe failure at a dent in the pipe wall. In one case, the dent resulted from the pipeline resting on a large pointed rock. In the second case, the failure resulted from a dent of unknown origin in the longitudinal seam weld of the pipe.

APPENDIX B

OIL PIPELINE GENERAL DATA REPORT

OIL PIPELINE FAILURE REPORT

OIL PIPELINE GENERAL DATA REPORT

CANADIAN PETROLEUM ASSOCIATION

YEAR 19 — Sheet ..... of .....

PIPELINE COMPANY OR SYSTEM

Name: .....

Address: .....

.....

INSTRUCTIONS

1. This report is for clean oil onshore pipeline systems covered by CSA Standard Z183 – Oil Pipeline Transportation Systems.
2. A separate report should be made for each operating pipeline system and forwarded to CPA within 30 days of each year end.
3. Zone Location questions apply only to systems handling High Vapour Pressure (HVP) material.
4. Reports by CPA member companies must be completed or reviewed for completeness by CPA Technical Committee or Pipeline Division member.

FAILURES

Number of Reportable Failures During Recording Calendar Year: (A failure report must be submitted for each reportable failure) .....

VOLUME DATA

Volume of Oil Transported During Year – LVP ..... m^3

– HVP ..... m^3

Volume – Distance during year – LVP ..... m^3 km

– HVP ..... m^3 km

CONSTRUCTION DATA

Pipeline Metrage at Various Depths of Cover:

Nominal Depth of Cover	Zone 1	Zone 2	Total System
Less than 75 cm	..... km	..... km	..... km
75 cm to 100 cm	..... km	..... km	..... km
101 cm to 125 cm	..... km	..... km	..... km
126 cm to 150 cm	..... km	..... km	..... km
Greater than 150 cm	..... km	..... km	..... km
Total System Metrage	..... km	..... km	..... km

PIPELINE SURVEILLANCE DATA

Pipeline Metrage Under Right-of-Way Surveillance:

Type of Surveillance	Zone	Metrage	Frequency
(a)	.....	..... km	.....
(b)	.....	..... km	.....
(c)	.....	..... km	.....
(d) No regular surveillance	.....	..... km	.....
Total System Metrage	.....	..... km	.....

Pipeline Metrage Under Leak Detection Surveillance:

Is the Pipeline system under ☐ manual ☐ automatic/computer leak detection surveillance. If Electronic or automatic provide details following:

Type of System	Zone 1	Zone 2
(a)	..... km	..... km
(b)	..... km	..... km
(c)	..... km	..... km
(d)	..... km	..... km

MAINLINE VALVE DATA

Mainline Valve or Check Valve Spacing:

Valve Spacing	Zone 1 Total Metrage	Zone 1 No. of Valves	Zone 2 Total Metrage	Zone 2 No. of Valves
Greater than 30 km	km		km	
21 km to 30 km	km		km	
11 km to 20 km	km		km	
5 km to 10 km	km		km	
Less than 5 km	km		km	
Total Metrage	km		km	

Number of Valves with Remote Operation: Zone 1 Zone 2

PIPE DATA

Include all specifications requested below for pipe sections of 1.0 km or more. For sections less than 1.0 km include specifications in totals for similar size pipe.

Zone	Outside Diameter	Wall Thickness	Length	Grade	Seam Type
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		
	mm	mm	km		

Use Additional Data Reports as Required.

GENERAL SYSTEM DATA

	Length (km)	Number of Stations	Number of Pumps	Installed Power (kW)	Storage (M^3)
Mainline	.....	.....	.....	.....	.....
Gathering	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....

Total number of full time employees: .....

REPORTED BY

Name: ..... Date Completed: .....

Title: ..... Telephone No.: .....

CPA * MEMBER

Name: ..... Date Checked: .....

* If applicable.

MAIL TO: Canadian Petroleum Association – Pipeline Division;
3800, 150 - 6th Avenue S.W., Calgary, Alberta T2P 3Y7

OIL PIPELINE FAILURE REPORT

CANADIAN PETROLEUM ASSOCIATION

Sheet ... of ...

PIPELINE COMPANY OR SYSTEM

Name .....

Address .....

INSTRUCTIONS

1. This report is for pipeline systems covered by CSA Standard Z183 – Oil Pipeline Transportation Systems. All data on this form will be kept confidential in accordance with request in "USE OF DATA" section.
2. A separate report should be made out for each failure and forwarded CPA as soon as possible, but not later than 60 days after the failure.
3. A reportable failure is one in which 1.5 m^3 or more of oil are released; OR one in which any High Vapour Pressure (HVP) material is released; OR one in which there is an injury, a death, a fire, or an explosion. Failures during controlled testing, when using oil as the test medium, should be reported in accordance with these guidelines.
4. Zone location questions apply only to failures involving HVPs.
5. Reports by CPA member companies must be completed or reviewed for completeness by CPA Technical Committee or Pipeline Division Member.
6. Property damage Costs reported under Failure Impact will be reported excluding product loss.

NOTE

Please complete all appropriate sectio ...cluding "WRITTEN ACCOUNT OF FAILURE" using Typewriter or Black Ink.

GENERAL INFORMATION

Date of Failure

Year	Month	Day	Time (24 h)
			:

Commodity Released

Volume Information – Cubic Metres

Released		Recovered		Lost
	+		-	

Recovered		Reclaimed		Disposed
	+		-	

Province

Nearest Town

Area Type ☐ Urban ☐ Rural

Spill was on ☐ Land ☐ Water

Terrain Type

Zone Location if applicable ☐ Zone 1 ☐ Zone 2

Installation Year of Failed Component 1 9 ☐ ☐

☐ Line Pipe ☐ Pump Station ☐ Tank Farm ☐ Delivery Point

MAJOR CAUSE OF FAILURE

Please Check One Only

☐ Internal Corrosion ☐ Defective Pipe ☐ Equipment Rupturing Line
☐ External Corrosion ☐ Defective Weld ☐ Pipe Previously Damaged
☐ Operational Error ☐ Equipment Failure ☐ Natural Hazard
☐ Other (Specify)

ORIGIN OF SPILL

Please Check One Only

☐ Pipe ☐ Scraper Trap ☐ Valve ☐ Meter
☐ Seam Weld ☐ Welded Fitting ☐ Pump ☐ Prover
☐ Girth Weld ☐ Bolted Fitting ☐ Tank ☐ Strainer
☐ Other (Specify)

DETECTION OF SPILL

☐ Outside Party ☐ Pipeline Employee ☐ Leak Detection System

Leak Detection System is: ☐ Manual ☐ Transient Model ☐ Volume Balance

Was the leak detectable within the Leak Detection System ☐ Yes ☐ No

Describe .....

Time from Failure to Detection of Failure ... hrs ... min

FAILURE IMPACT

Number of Injuries		Number of Deaths		Fire	Explosion	Area Damaged (hectares)	
Employees	Others	Employees	Others	Yes / No	Yes / No	Pipeline	Others

Clean-up Costs	Property Damage Costs		Clean-up Time	Duration of System Shutdown	
	Pipeline	Others			
$	$	$	Days	Days	Hours

IF FAILURE OCCURRED IN PIPE

Pipe Diameter (mm)	Pipe Wall Thickness (mm)	Specification and Grade	Type of Seam Weld	Type of Girth Weld	Metallurgical Report Done? ☐ Yes ☐ No

Depth of Cover if Below Ground (cm)	Configuration at Point of Failure ☐ Straight ☐ Sag Bend ☐ Side Bend ☐ Overbend	Type of Coating	Condition of Coating	Size of Failure (Major Dimension) (mm)

Allowable Operating Pressure (kPa)	Pressure at Time and Location of Failure (kPa)	Date of Last Pressure Test Y	M	D	Distance to Nearest Valve Upstream (km)	Downstream (km)	Evidence of Brittle Fracture? ☐ Yes ☐ No	Flowrate at Time of Failure (m^3/h)

IF CORROSION

☐ Internal ☐ External	If Internal, was Inhibitor Used? ☐ Yes ☐ No	If External, was System under Cathodic Protection? ☐ Yes ☐ No	Type of Cathodic Protection	Appearance of Failed Facility

IF EQUIPMENT RUPTURING LINE

Type of Equipment and Activity Causing Failure	Was Equipment Operator Aware of Pipeline? How? ☐ Yes ☐ No	Was Pipeline ...re of Equipment Acti... ? How? ☐ Yes ☐ No	Was One-Call System in Operation? ☐ Yes ☐ No

Frequency and Type of ROW Surveillance at Failure Location	Did Failure Occur at Time of Damage ☐ Yes ☐ No	If Previous Damage, How Long between Damage and Failure?	Distance to Nearest Warning Sign (m)

WRITTEN ACCOUNT OF FAILURE

Include a brief written account of the failure with any special details, recommendations that may prevent similar failures or information that may assist Standard and Code writing bodies. (Other written reports of the failure may be attached.)

USE OF DATA

Please Check One Only:

☐ Data on this form must be restricted to use by CPA only.

☐ Data on this form may be reviewed by CSA Z-183 Technical Committee.

REPORTED BY

Name — Date Completed

Title — Telephone No.

CPA * MEMBER

Name — Date Checked

* If applicable

MAIL TO: Canadian Petroleum Association – Pipeline Division,
3800, 150 - 6th Avenue S.W., Calgary, Alberta T2P 3Y7

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APPENDIX C

1988 OIL PIPELINE PERFORMANCE REVIEW

PARTICIPATING PIPELINES

CANADIAN PETROLEUM ASSOCIATION
1988 OIL PIPELINE PERFORMANCE REVIEW

PARTICIPATING PIPELINE OPERATORS AND COMPANIES

ALBERTA ENERGY CO. LTD.

- Alberta Oil Sands Pipeline
- Cold Lake Bitumen Blend
- Cold Lake Diluent Line
- Redwater Pipeline

AMOCO CANADA PETROLEUM COMPANY LTD.

- Alberta Ethane Gathering System Ltd.
- Aurora Pipe Line Company
- Cochin Pipe Lines Limited
- Amoco Cochrane - Edmonton Pipeline
- Empress - Kerrobert Pipeline
- Rangeland Pipe Line Company
- NGL Pipeline Ltd. (EDS North)

BP RESOURCES CANADA LIMITED

- Chauvin/Hardisty
- Red Earth

ESSO PETROLEUM CANADA

- Quebec South Shore Pipe Line
- Sarnia Products Pipe Line
- Winnipeg Pipeline Company Limited

ESSO PETROLEUM CANADA - IMPERIAL PIPELINE COMPANY LIMITED

- Excelsior/Fairydell Crude System
- Leduc Crude System
- Acheson/Golden Spike System
- Redwater Propane System
- Alberta Butane System
- Edmonton-Sundre Crude Line
- Judy Creek Condensate PipeLine
- Nisku Products Pipeline Company Limited
- Kamloops Tie-in

ESSO RESOURCES CANADA

- Quirk Creek System

GULF CANADA RESOURCES LIMITED

- Gulf Alberta Pipe Line
- Valley Pipe Line
- Rimbey Pipeline Co. Ltd.
- Fort Saskatchewan Pipeline
- Wabasca River Pipeline

HOME OIL COMPANY LIMITED

- Cremona Pipe Line Division
- Federated Crude System
- Federated NGL System
- Manyberries Pipe Line

HUSKY OIL OPERATIONS LTD.

INTERPROVINCIAL PIPE LINE LIMITED

INTERPROVINCIAL PIPE LINE LIMITED (NW)

MOBIL OIL CANADA LTD.

- Rainbow Pipe Line Company Company Ltd.
- South Saskatchewan Pipe Line Company

MONTREAL PIPE LINE LIMITED

MURPHY OIL COMPANY LTD.

- Cactus Lake Pipeline
- Milk River Pipeline
- Wascana Pipeline Ltd.
- Manito Pipelines Ltd.
- Bodo Pipeline NR

NORCEN ENERGY RESOURCES LTD.

- Manitoba Pipeline
- B.C. Pipeline
- Joarcam
- Golden
- Saskatchewan Pipeline

NOVACORP PIPELINES LTD.

- Porcupine Hills Pipeline NR
- Tanghe Creek Condensate Line NR

PEACE PIPE LINE LTD.

PEMBINA PIPELINE

PETRO-CANADA PRODUCTS

- Stony Beach Pipeline
- Saskatoon Pipeline
- Alberta Products Pipe Line Ltd.

PETRO-CANADA RESOURCES

- Petroleum Transmission Company

PRODUCERS PIPELINE INC.

- Producers/Westspur Pipeline

SUN-CANADIAN PIPE LINE COMPANY LIMITED

SUN PIPE LINE COMPANY

SUNCOR INC.

- Blueberry Taylor Pipeline
- Ft. McMurray to Edmonton Oil Pipeline

TEXACO CANADA RESOURCES LTD.

- Rimbey to Edmonton System
- Bonnie Glen System
- Bonnie Geln to West Pembina
- A.E.G.S. to Bonnie Glen
- Green River System

TRANS MOUNTAIN PIPE LINE COMPANY LTD.

TRANS-NORTHERN PIPELINES INC.

UNOCAL CANADA LIMITED

WESTCOAST PETROLEUM LTD.

NOTE: NR = New Report